SUBSTRATE TREATING DEVICE

Publication number: JP2001172794
Publication date: 2001-06-26
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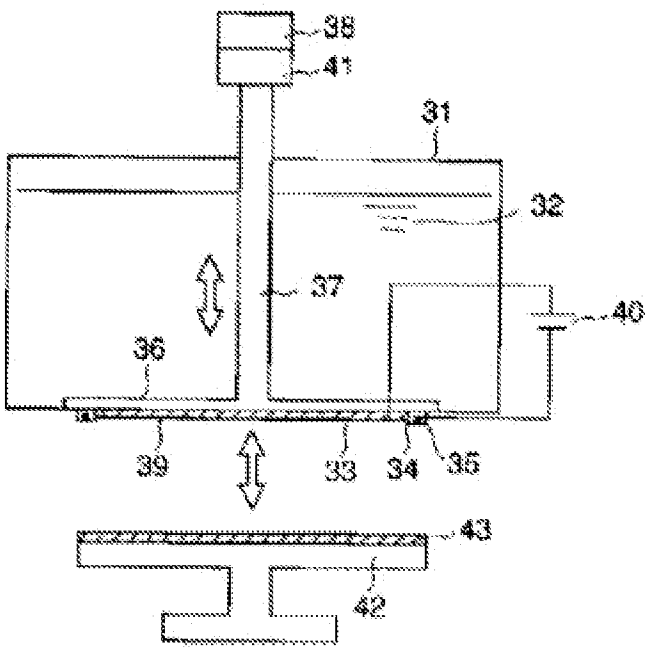
Classification:
- international: ***C25D7/12; C23G3/00; C25D5/04; C25D17/00; C25D21/00;*** **C25D7/12; C23G3/00; C25D5/00; C25D17/00; C25D21/00;** (IPC1-7): C25D7/12; C23G3/00; C25D5/04; C25D17/00
- European:
Application number: JP19990357819 19991216
Priority number(s): JP19990357819 19991216

Abstract of **JP2001172794**

PROBLEM TO BE SOLVED: To provide a substrate treating device by which the injecting and discharging time of a processing solution is shortened, the lowering of quality as the time is prolonged is prevented, and further the error in working or assembling a counter electrode is absorbed to obtain high-quality plating. SOLUTION: A plating solution 32 is constantly introduced into a plating vessel 31, a lid 36 is liftably provided in the vessel 31, and the counter electrode 39 is fixed to the lower face of the lid 36. The lid 36 is lowered before plating is started and when plating is finished to close an opening 33 in the bottom of the vessel 31. When plating is conducted, a semiconductor wafer 43 is positioned at the opening 33, and the lid 36 and counter electrode 39 are moved upward in the vessel 31 and horizontally rotated at the highest position.



(19)日本国特許庁（ＪＰ）　(12)公開特許公報（Ａ）　(11)特許出願公開番号
特開2001－172794
（P2001－172794A）
(43)公開日　平成13年６月26日(2001.6.26)

(51)Int.Cl.[7]	識別記号	ＦＩ		テーマコード（参考）
Ｃ２５Ｄ　7/12		Ｃ２５Ｄ　7/12		４Ｋ０２４
Ｃ２３Ｇ　3/00		Ｃ２３Ｇ　3/00	Ｚ	４Ｋ０５３
Ｃ２５Ｄ　5/04		Ｃ２５Ｄ　5/04		
17/00		17/00	Ｂ	
21/00		21/00	Ｚ	

審査請求　未請求　請求項の数４　ＯＬ　（全　５　頁）

(21)出願番号　特願平11－357819

(22)出願日　平成11年12月16日(1999.12.16)

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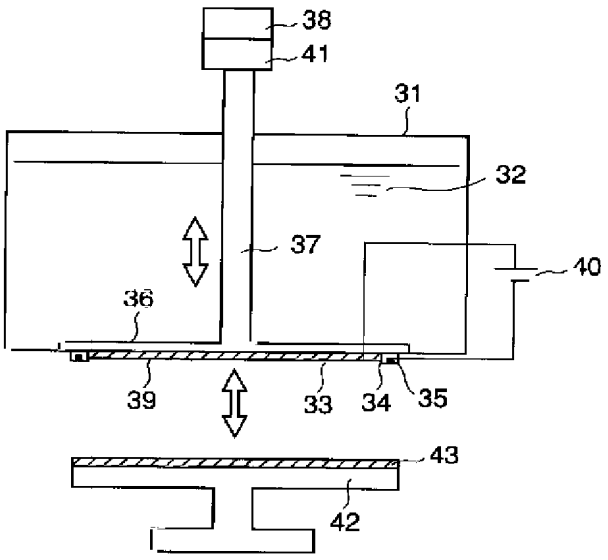
(54)【発明の名称】　基板処理装置

(57)【要約】
【課題】　処理液の注入および排出時間を短時間として、それらの時間が長くかかることにより生じる品質低下を解決でき、さらに、電解めっき装置の具体例において、対向電極の加工、組立誤差を吸収して高品質なめっきを得ることができる基板処理装置を提供すること。
【解決手段】　めっき処理容器３１内に常時めっき液３２を収容するとともに、処理容器３１内に昇降自在に蓋体３６を設け、この蓋体３６に下面に対向電極３９を固定する。蓋体３６は、めっき開始前およびめっき終了時に下降して、処理容器３１底面の開口部３３を閉塞する。めっき処理時は、半導体ウェハ４３が開口部３３に位置し、蓋体３６および対向電極３９は処理容器３１内を上昇して、上昇した状態で水平に回転する。



【特許請求の範囲】
【請求項１】　処理液を常時収容し、底面に開口部を有する処理容器と、
この処理容器内に昇降可能に設けられ、下降すると、前記開口部を処理容器の内側から覆う蓋体と、
前記処理容器の下側に昇降可能に設けられ、上面に平板状被処理基板を保持し、上昇すると、前記処理容器底面の開口部に該開口部を閉塞して前記被処理基板を位置させる支持台とを具備することを特徴とする基板処理装置。
【請求項２】　処理容器底面の開口部を蓋体が覆った状態で支持台と一体に被処理基板が上昇して、この被処理基板が前記開口部に位置し、その状態で蓋体が処理容器内を上昇し、その後被処理基板に対する処理が終了した後、前記蓋体が下降しこの蓋体で前記開口部を塞いだ後、前記被処理基板が支持台と一体に下降し処理容器から離れることを特徴とする請求項１に記載の基板処理装置。
【請求項３】　請求項１または２に記載の基板処理装置において、処理容器の底面には、前記被処理基板が接触するように通電用電極が設けられ、蓋体の下面には対向電極が設けられ、さらに処理液はめっき液であって、装置は電解めっき装置であることを特徴とする基板処理装置。
【請求項４】　請求項３に記載の基板処理装置において、蓋体および対向電極は、処理容器内を上昇した状態において、水平に回転することを特徴とする基板処理装置。
【発明の詳細な説明】
【０００１】
【発明の属する技術分野】本発明は、半導体ウェハや液晶ガラスをはじめ、ディスク、レンズ等の平板状の基板に、薬液や純水等の処理液を用いて洗浄あるいは表面処理、さらには通電させることにより電解めっきを施す基板処理装置に関する。
【０００２】
【従来の技術】従来の基板処理装置として従来の電解めっき装置を図３に示す。この電解めっき装置は、半導体ウェハ用フェイスアップ型電解めっき装置である。この装置はめっき処理容器１１を有し、この処理容器１１内の上方所定位置には対向電極１２が固定される。処理容器１１は、底面が開口しており、この底面の外周端部には側面部に保持してパッキング１３と通電用電極１４が設けられる。通電用電極１４と対向電極１２間には直流電源１５が接続される。１６は、処理容器１１の底面下部に昇降自在に設けられたウェハ台で、処理容器１１の開口底面を覆う大きさを有し、上面には同一サイズの半導体ウェハ１７を保持する。この半導体ウェハ１７は、ウェハ台１６と一体に上昇すると、図のように、処理容器１１の開口底面に該底面を閉塞して位置する。このとき、半導体ウェハ１７の外周端部表面は、パッキング１３および通電用電極１４に密着する。１８はめっき液タンクで、このタンク１８内のめっき液１９は、循環ポンプ２０により液供給側配管２１を介して処理容器１１内に供給される。処理容器１１内のめっき液１９は、排液側配管２２を介してめっき液タンク１８に回収される。
【０００３】上記の装置で半導体ウェハ１７に対して電解めっきを施す場合は、半導体ウェハ１７をウェハ台１６上に保持してウェハ台１６と一体に処理容器１１の底面方向に上昇させることにより、図のように、半導体ウェハ１７を、処理容器１１の開口底面に、該底面を閉塞して位置させる。このとき、半導体ウェハ１７の外周端部表面はパッキング１３に密着して外周端部でのシールを図るとともに、通電用電極１４に密着して半導体ウェハ１７と直流電源１５との通電を確保する。その後、循環ポンプ２０によってめっき液タンク１８から配管２１を介して処理容器１１内にめっき液１９を供給する。この供給によって、半導体ウェハ１７の表面から対向電極１２までの処理容器１１内がめっき液１９によって満たされると、半導体ウェハ１７と対向電極１２間に電流が流れ、半導体ウェハ１７の表面（処理面）に対して電解めっきが開始される。その後、電解めっき処理が終了すると循環ポンプ２０が停止し、処理容器１１内に残っためっき液１９が配管２２から、重力または気体による圧送によりめっき液タンク１８に回収される。その後、ウェハ台１６と一体に半導体ウェハ１７を下降させて半導体ウェハ１７を処理容器１１から離し、さらに半導体ウェハ１７をウェハ台１６上から取り外す。
【０００４】
【発明が解決しようとする課題】ところで、半導体ウェハに電解めっきをする場合、半導体ウェハの処理面に通電用に銅の薄膜を設けるが、一般的なめっき液は強酸であるため、この薄膜は、めっき液に接触するとエッチングされ溶解してしまう。薄膜がエッチングされ不連続になると、その部分には電流が流れなくなり、めっきできなくなる。薄膜に不連続部分が発生する時間は、膜厚とエッチング速度によるが、配線パターンの微細化に対応し、薄膜をより薄くする傾向にある。このため、液の供給開始から通電開始までの時間をできるだけ短くする必要がある。
【０００５】しかし、従来の上記フェイスアップ型の電解めっき装置では、めっき液タンク１９がめっき処理容器１１の下側もしくは装置外に設置され、めっき時にめっき処理容器１１へポンプ２０でめっき液１９を送る構造になっていた。したがって、半導体ウェハ１７表面から対向電極１２の間にめっき液１９が充満し通電するまでの時間がかかり、下地を溶かすという問題点があり、高品質のめっきを得ることができなかった。また、めっき液１９の排出にも時間がかかり、成膜しためっき表面を溶かし品質を劣化させる欠点があった。

【０００６】また、半導体配線パターンの微細化につれて、めっき膜厚の管理も厳しくなってきている。僅かな加工、組立誤差が、めっき膜厚に反映されてしまう可能性がある。従来の上記フェイスアップ型電解めっき装置では、めっき膜厚に大きな影響を与える対向電極１２が固定されているため、加工、組立誤差を吸収できず、充分なめっき品質を得ることが難しいという問題点があった。

【０００７】本発明は上記の点に鑑みなされたもので、処理液の注入および排出時間を短時間として、それらの時間が長くかかることにより生じる品質低下を解決できる基板処理装置を提供することを第１の目的をする。さらに、本発明は、対向電極の加工、組立誤差を吸収して高品質なめっきを得ることができる基板処理装置を提供することを第２の目的とする。

【０００８】

【課題を解決するための手段】本発明の基板処理装置は、処理液を常時収容し、底面に開口部を有する処理容器と、この処理容器内に昇降可能に設けられ、下降すると、前記開口部を処理容器の内側から覆う蓋体と、前記処理容器の下側に昇降可能に設けられ、上面に平板状被処理基板を保持し、上昇すると、前記処理容器底面の開口部に該開口部を閉塞して前記被処理基板を位置させる支持台とを具備することを特徴とする。

【０００９】この基板処理装置は、処理容器底面の開口部を蓋体が覆った状態で支持台と一体に被処理基板が上昇して、この被処理基板が前記開口部に位置し、その状態で蓋体が処理容器内を上昇し、その後被処理基板に対する処理が終了した後、前記蓋体が下降しこの蓋体で前記開口部を塞いだ後、前記被処理基板が支持台と一体に下降し処理容器から離れるように動作する。

【００１０】上記の基板処理装置において、処理容器の底面には、前記被処理基板が接触するように通電用電極が設けられ、蓋体の下面には対向電極が設けられ、さらに処理液はめっき液であって、装置は一具体例としては電解めっき装置である。この電解めっき装置において、蓋体および対向電極は、処理容器内を上昇した状態において、水平に回転する。

【００１１】

【発明の実施の形態】次に添付図面を参照して本発明による基板処理装置の実施の形態を詳細に説明する。図１および図２は本発明の実施の形態として、本発明による半導体ウェハフェイスアップ型電解めっき装置を示す断面図である。これらの図において、３１はめっき液タンクを兼ねるめっき処理容器であり、内部には常時めっき液３２が収容される。この処理容器３１の底面には開口部３３が形成され、開口部　　３３の外周縁部にはパッキング３４と通電用電極３５が設けられる。処理容器　３１内には平板状の蓋体３６が設けられる。この蓋体３６は、軸３７を介して、処理容器３１上方外部の昇降駆動部３８に連結されており、この昇降駆動部　　３８と軸３７とによって処理容器３１内を昇降可能であり、下降すると、図１に示すように、処理容器３１底面の開口部３３を、処理容器３１の内側から覆う。このような蓋体３６の下面には対向電極３９が取り付けられ、この対向電極３９と前記通電用電極３５間には直流電源４０が接続される。また、蓋体３６を支持する軸３７は、処理容器３１の上方外部で回転駆動部４１に連結されており、蓋体３６および対向電極３９は、図２に示すように処理容器３１内を上昇した状態において軸３７と一体に水平に回転駆動される。処理容器３１の下方にはウェハ台４２が昇降可能に設けられる。このウェハ台４２は、上面に半導体ウェハ４３を支持し、上昇すると、図２に示すように、半導体ウェハ４３を処理容器３１の底面開口部３３に該開口部３３を閉塞して位置させる。このとき、半導体ウェハ４３の外周端部表面はパッキング３４と通電用電極３５に密着する。

【００１２】上記のような電解めっき装置により半導体ウェハ４３に対して電解めっきを行う場合について説明する。めっき開始前においては、図１に示すように蓋体３６が下降して処理容器３１底面の開口部３３を蓋体３６が覆っており、処理容器３１内のめっき液３２が漏れないようになっている。また、ウェハ台４２も下降して、その上面の半導体ウェハ４３は処理容器３１から離れている。

【００１３】めっき作業が開始されると、まずウェハ台４２が上昇して、その上面に支持された半導体ウェハ４３が図２に示すように処理容器３１の底面開口部３３に該開口部３３を閉塞して位置する。このとき、半導体ウェハ４３の外周端部表面はパッキング３４に密着して外周端部でのシールを図るとともに、通電用電極３５に密着して半導体ウェハ４３と直流電源４０との通電を確保する。その後、同図２に示すように、蓋体３６およびその下面の対向電極３９が昇降駆動部３８により処理容器３１内の上方所定位置まで引き上げられる。すると、蓋体３６が処理容器３１の底面から離れた瞬間から処理容器３１のめっき液３２が半導体ウェハ４３の表面（処理面）と対向電極３９間に満たされて、互いに対向した対向電極３９と半導体ウェハ４３間に電流が流れ、半導体ウェハ４３の処理面に対してめっき処理が開始される。このとき、回転駆動部４１によって、蓋体３６および対向電極３９は水平に回転される。

【００１４】上記のようにしてめっき処理が行われ、めっき処理が終了すると、蓋体３６が昇降駆動部３８により再び下降し、蓋体３６が図１に示すように処理容器３１の底面開口部３３を再び覆った状態となる。その後、同図１に示すようにウェハ台４２が下降し、半導体ウェハ４３が処理容器３１から離れ、さらに半導体ウェハ４３をウェハ台４２上から取り外す。

【００１５】以上のような電解めっき装置によれば、処

理容器３１内に常時めっき液３２が収容されていて、蓋体３６が上昇し処理容器３１の底面から離れると、半導体ウェハ４３の処理面と対向電極３９間は瞬時にめっき液３２で満たされ通電可能となる。このため、半導体ウェハ４３の処理面に成膜された銅の薄膜のエッチングを防止することができ、高品質のめっきが可能となる。また、蓋体３６および対向電極３９を水平に回転させることで、加工誤差や組立誤差による対向電極３９の半導体ウェハ４３に対する傾きや偏芯を吸収することができる。これは対向電極が固定されていると、傾きや偏芯により半導体ウェハから対向電極までの距離が一定でない場合があるが、対向電極を回転させると、距離の微妙なずれを常に動かすことで吸収できるということであり、その結果、高品質なめっきを得ることができる。処理終了後は、蓋体３６下降時に微弱電流を流すことで成膜された銅のめっきのエッチングを防止すると同時に、蓋体３６が処理容器３１の底面の開口部３３を塞ぐと瞬時にめっき液３２が排出された状態と等しくなりすぐに半導体ウェハ４３を取出すことができるので、成膜しためっき表面を無通電でエッチングする時間を極限まで短縮することができ、品質劣化を防止できる。

【００１６】なお、以上は、本発明を電解めっき装置に応用した場合であるが、昇降可能な蓋体を用いて処理液の供給、排出時間を短縮する技術は、洗浄装置やその他の表面処理装置に用いて処理品質の向上を図ることができる。さらに、被処理基板は、半導体ウェハ以外の液晶ガラスやディスクなどの平板状基板であってもよい。

【００１７】

【発明の効果】以上詳細に説明したように本発明の基板処理装置によれば、処理液の注入および排出時間を短時間として、それらの時間が長くかかることにより生じる品質低下を解決できる。さらに、電解めっき装置の具体例において、対向電極の加工、組立誤差を吸収して高品質なめっきを得ることができる。

【図面の簡単な説明】

【図１】本発明による基板処理装置の実施の形態を示す断面図。

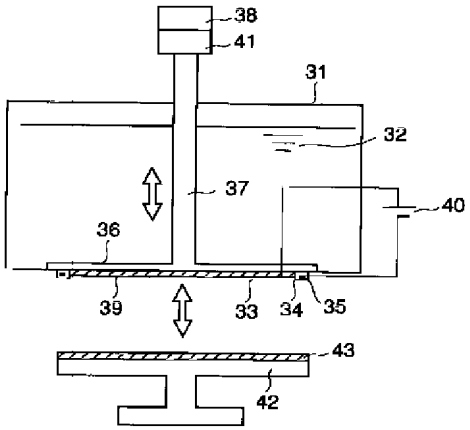
【図２】本発明の実施の形態の装置を他の動作状態で示す断面図。

【図３】従来の半導体ウェハ用フェイスアップ型電解めっき装置を示す構成図。

【符号の説明】

３１　めっき処理容器
３２　めっき液
３３　開口部
３５　通電用電極
３６　蓋体
３８　昇降駆動部
３９　対向電極
４１　回転駆動部
４２　ウェハ台
４３　半導体ウェハ

【図１】



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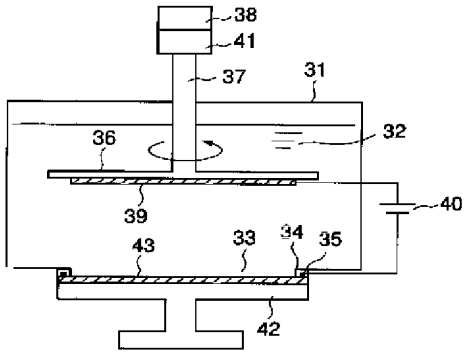
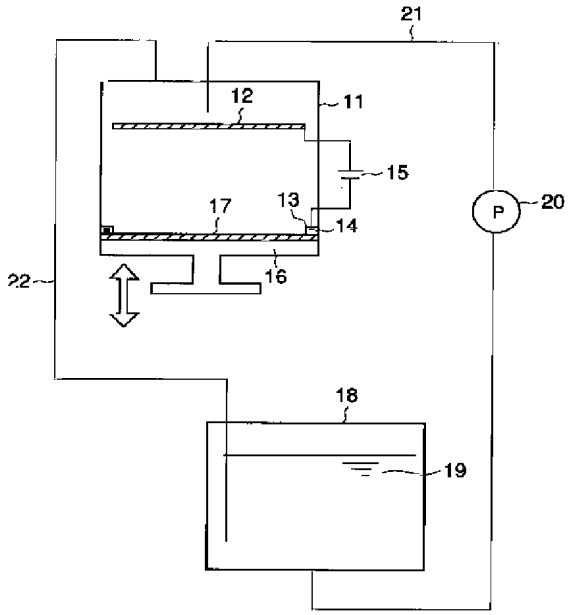


【図３】



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Ｆターム(参考)　4K024 BB12 CB01 CB02 CB26
4K053 SA06 TA15 XA45 XA50

INFORMAL ENGLISH TRANSLATION OF JAPANESE REFERENCE NO. 2001-172794

* NOTICES *

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TECHNICAL FIELD

[Field of the Invention]A semiconductor wafer and liquid crystal glass are begun, treating solutions, such as a drug solution and pure water, are used for plate-like substrates, such as a disk and a lens, and washing or a surface treatment, and a pan are made to energize in this invention.
Therefore, it is related with the substrate processing device which performs electrolysis plating.

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PRIOR ART

[Description of the Prior Art]The conventional electrolysis plating device is shown in drawing 3 as a conventional substrate processing device. This electrolysis plating device is a face-up type electrolysis plating device for semiconductor wafers. This device has the plating treatment container 11, and the counterelectrode 12 is fixed to the upper part prescribed position in this treatment container 11. The bottom is carrying out the opening of the treatment container 11. In the peripheral end of this bottom, it holds at a lateral portion, and the packing 13 and the electrode 14 for energization are formed.
DC power supply 15 are connected between the electrode 14 for energization, and the counterelectrode 12. 16 is the wafer stand established in the lower part of the bottom of the treatment container 11 enabling free rise and fall, has a wrap size for the opening base of the treatment container 11, and holds the semiconductor wafer 17 of the same size on the upper surface. If this semiconductor wafer 17 goes up to the wafer stand 16 and one, as shown in a figure, this bottom is blockaded in the opening base of the treatment container 11, and it is located in it. At this time, the peripheral end surface of the semiconductor wafer 17 is stuck to the packing 13 and the electrode 14 for energization. 18 is a plating fluid tank and the plating liquid 19 in this tank 18 is supplied in the treatment container 11 via the liquid supply side piping 21 by the circulating pump 20. The plating liquid 19 in the treatment container 11 is collected by the plating fluid tank 18 via the effluent side piping 22.
[0003]When performing electrolysis plating to the semiconductor wafer 17 with an above device, By holding the semiconductor wafer 17 on the wafer stand 16, and raising it in the direction of the bottom of the treatment container 11 at the wafer stand 16 and one, as shown in a figure, this bottom is blockaded in the opening base of the treatment container 11, and the semiconductor wafer 17 is located in it. While sticking the peripheral end surface of the semiconductor wafer 17 to the packing 13 and planning the seal in a peripheral end at this time, it sticks to the electrode 14 for energization, and energization with the semiconductor wafer 17 and DC power supply 15 is secured. Then, the plating liquid 19 is supplied in the treatment container 11 via the piping 21 from the plating fluid tank 18 with the circulating pump 20. If the inside of the treatment container 11 from the surface of the semiconductor wafer 17 to the counterelectrode 12 is filled by the plating liquid 19, current will flow between the semiconductor wafer 17 and the counterelectrode 12, and electrolysis plating will be started to the surface (treated surface) of the semiconductor wafer 17 by this supply. Then, after electrolysis plating processing is completed, the circulating pump 20 stops, and the plating liquid 19 which remained in the treatment container 11 is collected from the piping 22 by the plating fluid tank 18 by feeding with gravity or a gas. Then, the semiconductor wafer 17 is dropped to the wafer stand 16 and one, the semiconductor wafer 17 is separated from the treatment container 11, and the semiconductor wafer 17 is further removed from on the wafer stand 16.

[Translation done.]

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EFFECT OF THE INVENTION

[Effect of the Invention]As explained to details above, according to the substrate processing device of this invention, those time can solve the debasement produced by this thing for a long time by making pouring of a treating solution and exhaust time into a short time. In the example of an electrolysis plating device, processing of a counterelectrode and an assembly error can be absorbed and quality plating can be obtained.

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TECHNICAL PROBLEM

[Problem(s) to be Solved by the Invention]By the way, since common plating liquid is strong acid although a copper thin film is provided in the treated surface of a semiconductor wafer for energization when carrying out electrolysis plating to a semiconductor wafer, if this thin film contacts plating liquid, it will be etched and it will dissolve. When a thin film is etched and it becomes discontinuous, current will not flow into the portion and it becomes impossible to plate. Although time for a discontinuous part to occur in a thin film is based on thickness and an etch rate, it corresponds to the minuteness making of a circuit pattern, and is in the tendency which makes a thin film thinner. For this reason, it is necessary to shorten time from the supply start of liquid to an energization start as much as possible.
[0005]However, in the conventional face-up [above-mentioned] type electrolysis plating device, the plating fluid tank 19 was installed out of the plating treatment container 11 bottom or a device, and it had become the structure of sending the plating liquid 19 to the plating treatment container 11 with the pump 20 at the time of plating. Therefore, time until the plating liquid 19 is full between the counterelectrodes 12 and it energizes from the semiconductor wafer 17 surface is taken, there is a problem of melting a ground, and quality plating was not able to be obtained. There was a fault which discharge of the plating liquid 19 also takes time, melts the plating surface which formed membranes, and degrades quality.
[0006]Along with the minuteness making of a semiconductor circuit pattern, management of plating thickness is also becoming severe. Slight processing and an assembly error may be reflected in plating thickness. In the conventional above-mentioned face-up type electrolysis plating device, since the counterelectrode 12 which has big influence on plating thickness was being fixed, processing and an assembly error could not be absorbed but there was a problem that it was difficult to acquire sufficient plating quality.
[0007]This invention was made in view of the above-mentioned point, makes a short time pouring of a treating solution and exhaust time, and those time carries out the 1st purpose for providing the substrate processing device which can solve the debasement produced by this thing for a long time. This invention sets it as the 2nd purpose to provide the substrate processing device which a counterelectrode can process it, can absorb an assembly error and can obtain quality plating.

[Translation done.]

* NOTICES *

MEANS

[Means for Solving the Problem]A treatment container which a substrate processing device of this invention always accommodates a treating solution, and has an opening on the bottom, When it is provided in this treatment container so that rise and fall are possible, and it descends, said opening The inside of a treatment container to a wrap lid, If it is provided in said treatment container bottom so that rise and fall are possible, and a plate-like processed board is held on the upper surface and it goes up, a buck which blockades this opening in an opening at said bottom of a treatment container and in which said processed board is located is provided.
[0009]As for this substrate processing device, after a lid has covered an opening at the bottom of a treatment container, a processed board goes up to a buck and one, After said lid descends after this processed board is located in said opening, a lid goes up inside of a treatment container in that state and processing to a processed board is completed after that, and this lid closes said opening, it operates so that said processed board may descend to a buck and one and may separate from a treatment container.
[0010]In the above-mentioned substrate processing device, an electrode for energization is provided in the bottom of a treatment container so that said processed board may contact, a counterelectrode is provided in the undersurface of a lid, a treating solution is plating liquid further and a device is an electrolysis plating device as one example. In this electrolysis plating device, a lid and a counterelectrode rotate horizontally in the state where inside of a treatment container was gone up.
[0011]
[Embodiment of the Invention]Next, with reference to an accompanying drawing, the embodiment of the substrate processing device by this invention is described in detail. Drawing 1 and drawing 2 are the sectional views showing the semiconductor wafer face-up type electrolysis plating device by this invention as an embodiment of the invention. In these figures, 31 is a plating treatment container which serves as a plating fluid tank, and the plating liquid 32 is always accommodated in an inside. The opening 33 is formed in the bottom of this treatment container 31, and it is an opening. The packing 34 and the electrode 35 for energization are formed in the outer periphery part of 33. Treatment container The plate-like lid 36 is formed in 31. Via the axis 37, it connects with the rise-and-fall actuator 38 of the treatment container 31 upper-part exterior, and this lid 36 is this rise-and-fall actuator. When it can go up and down the inside of the treatment container 31 and descends with 38 and the axis 37, as shown in drawing 1, it is a wrap from the inside of the treatment container 31 about the opening 33 of the treatment container 31 bottom. The counterelectrode 39 is attached to the undersurface of such a lid 36, and DC power supply 40 are connected between this counterelectrode 39 and said electrode 35 for energization. The axis 37 which supports the lid 36 is connected with the rotation part 41 in the upper part exterior of the treatment container 31, and the lid 36 and the counterelectrode 39 rotate the inside of the treatment container 31 at a level with the axis 37 and one in the state

where it went up, as shown in drawing 2. The wafer stand 42 is established in the lower part of the treatment container 31 so that rise and fall are possible. If this wafer stand 42 supports the semiconductor wafer 43 on the upper surface and goes up on it, as shown in drawing 2, this opening 33 is blockaded in the bottom opening 33 of the treatment container 31, and it locates the semiconductor wafer 43 in it. At this time, the peripheral end surface of the semiconductor wafer 43 is stuck to the packing 34 and the electrode 35 for energization.

[0012]The case where the above electrolysis plating devices perform electrolysis plating to the semiconductor wafer 43 is explained. Before the plating start, as shown in drawing 1, the lid 36 descended, the lid 36 has covered the opening 33 of the treatment container 31 bottom, and the plating liquid 32 in the treatment container 31 leaks. The wafer stand 42 also descended and the semiconductor wafer 43 of the upper surface is separated from the treatment container 31.

[0013]If plating is started, the wafer stand 42 goes up first, and as the semiconductor wafer 43 supported by the upper surface shows drawing 2, this opening 33 is blockaded in the bottom opening 33 of the treatment container 31, and it is located in it. While sticking the peripheral end surface of the semiconductor wafer 43 to the packing 34 and planning the seal in a peripheral end at this time, it sticks to the electrode 35 for energization, and energization with the semiconductor wafer 43 and DC power supply 40 is secured. Then, as shown in the drawing 2, the counterelectrode 39 of the lid 36 and its undersurface can pull up to the upper part prescribed position in the treatment container 31 by the rise-and-fall actuator 38. Then, the plating liquid 32 of the treatment container 31 is filled between the surface (treated surface) of the semiconductor wafer 43, and the counterelectrode 39 from the moment the lid 36 separated from the bottom of the treatment container 31, Current flows between the counterelectrode 39 and the semiconductor wafer 43 which countered mutually, and plating processing is started to the treated surface of the semiconductor wafer 43. At this time, the lid 36 and the counterelectrode 39 rotate horizontally by the rotation part 41.

[0014]After plating processing is performed as mentioned above and plating processing is completed, the lid 36 descends again by the rise-and-fall actuator 38, and the lid 36 will be in the state where the bottom opening 33 of the treatment container 31 was again covered as shown in drawing 1. Then, as shown in the drawing 1, the wafer stand 42 descends, and the semiconductor wafer 43 separates from the treatment container 31, and removes the semiconductor wafer 43 from on the wafer stand 42 further.

[0015]If according to the above electrolysis plating devices the plating liquid 32 is always accommodated in the treatment container 31, the lid 36 goes up and it separates from the bottom of the treatment container 31, it will be filled with the plating liquid 32 in an instant between the treated surface of the semiconductor wafer 43, and the counterelectrode 39, and energization of it will be attained. For this reason, etching of the thin film of the copper formed in the treated surface of the semiconductor wafer 43 can be prevented, and quality plating is attained. The inclination and eccentricity to the semiconductor wafer 43 of the counterelectrode 39 by the working error or an assembly error are absorbable by rotating the lid 36 and the counterelectrode 39 horizontally. This may have a constant distance from a semiconductor wafer to a counterelectrode by neither inclination nor eccentricity, if the counterelectrode is being fixed, but if a counterelectrode is rotated, I hear that it can absorb by always moving a delicate gap of distance, it is, and, as a result, quality plating can be obtained. At the same time after the end of processing prevents etching of plating of the copper formed by sending weak current at the time of lid 36 descent, Since it becomes equal to the state where the plating liquid 32 was discharged in an instant and the semiconductor wafer 43 can be taken out shortly after the lid 36 plugs up the opening 33 of the bottom of the treatment container 31, time to etch the plating surface which formed membranes by no energizing can be shortened to a limit, and quality degradation can be prevented.

[0016]Although the above is a case where this invention is applied to an electrolysis plating

device, the art of shortening supply of a treating solution and exhaust time using the lid which can go up and down can be used for a washing station or other surface treatment devices, and can aim at improvement in treatment quality. Processed boards may be plate shaped substrates, such as liquid crystal glass other than a semiconductor wafer, and a disk.

[Translation done.]

* NOTICES *

DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]
[Drawing 1]The sectional view showing the embodiment of the substrate processing device by this invention.
[Drawing 2]The sectional view showing the device of an embodiment of the invention according to other operating states.
[Drawing 3]The lineblock diagram showing the conventional face-up type electrolysis plating device for semiconductor wafers.
[Description of Notations]
31 Plating treatment container
32 Plating liquid
33 Opening
35 The electrode for energization
36 Lid
38 Rise-and-fall actuator
39 Counterelectrode
41 Rotation part
42 Wafer stand
43 Semiconductor wafer

[Translation done.]

* NOTICES *

DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Field of the Invention]A semiconductor wafer and liquid crystal glass are begun, treating solutions, such as a drug solution and pure water, are used for plate-like substrates, such as a disk and a lens, and washing or a surface treatment, and a pan are made to energize in this invention.
Therefore, it is related with the substrate processing device which performs electrolysis plating.

[0002]
[Description of the Prior Art]The conventional electrolysis plating device is shown in drawing 3 as a conventional substrate processing device. This electrolysis plating device is a face-up type electrolysis plating device for semiconductor wafers. This device has the plating treatment container 11, and the counterelectrode 12 is fixed to the upper part prescribed position in this treatment container 11. The bottom is carrying out the opening of the treatment container 11. In the peripheral end of this bottom, it holds at a lateral portion, and the packing 13 and the electrode 14 for energization are formed.
DC power supply 15 are connected between the electrode 14 for energization, and the counterelectrode 12. 16 is the wafer stand established in the lower part of the bottom of the treatment container 11 enabling free rise and fall, has a wrap size for the opening base of the treatment container 11, and holds the semiconductor wafer 17 of the same size on the upper surface. If this semiconductor wafer 17 goes up to the wafer stand 16 and one, as shown in a figure, this bottom is blockaded in the opening base of the treatment container 11, and it is located in it. At this time, the peripheral end surface of the semiconductor wafer 17 is stuck to the packing 13 and the electrode 14 for energization. 18 is a plating fluid tank and the plating liquid 19 in this tank 18 is supplied in the treatment container 11 via the liquid supply side piping 21 by the circulating pump 20. The plating liquid 19 in the treatment container 11 is collected by the plating fluid tank 18 via the effluent side piping 22.
[0003]When performing electrolysis plating to the semiconductor wafer 17 with an above device, By holding the semiconductor wafer 17 on the wafer stand 16, and raising it in the direction of the bottom of the treatment container 11 at the wafer stand 16 and one, as shown in a figure, this bottom is blockaded in the opening base of the treatment container 11, and the semiconductor wafer 17 is located in it. While sticking the peripheral end surface of the semiconductor wafer 17 to the packing 13 and planning the seal in a peripheral end at this time, it sticks to the electrode 14 for energization, and energization with the semiconductor wafer 17 and DC power supply 15 is secured. Then, the plating liquid 19 is supplied in the treatment container 11 via the piping 21 from the plating fluid tank 18 with the circulating pump 20. If the inside of the treatment container 11 from the surface of the semiconductor wafer 17 to the

counterelectrode 12 is filled by the plating liquid 19, current will flow between the semiconductor wafer 17 and the counterelectrode 12, and electrolysis plating will be started to the surface (treated surface) of the semiconductor wafer 17 by this supply. Then, after electrolysis plating processing is completed, the circulating pump 20 stops, and the plating liquid 19 which remained in the treatment container 11 is collected from the piping 22 by the plating fluid tank 18 by feeding with gravity or a gas. Then, the semiconductor wafer 17 is dropped to the wafer stand 16 and one, the semiconductor wafer 17 is separated from the treatment container 11, and the semiconductor wafer 17 is further removed from on the wafer stand 16.

[0004]

[Problem(s) to be Solved by the Invention]By the way, since common plating liquid is strong acid although a copper thin film is provided in the treated surface of a semiconductor wafer for energization when carrying out electrolysis plating to a semiconductor wafer, if this thin film contacts plating liquid, it will be etched and it will dissolve. When a thin film is etched and it becomes discontinuous, current will not flow into the portion and it becomes impossible to plate. Although time for a discontinuous part to occur in a thin film is based on thickness and an etch rate, it corresponds to the minuteness making of a circuit pattern, and is in the tendency which makes a thin film thinner. For this reason, it is necessary to shorten time from the supply start of liquid to an energization start as much as possible.

[0005]However, in the conventional face-up [above-mentioned] type electrolysis plating device, the plating fluid tank 19 was installed out of the plating treatment container 11 bottom or a device, and it had become the structure of sending the plating liquid 19 to the plating treatment container 11 with the pump 20 at the time of plating. Therefore, time until the plating liquid 19 is full between the counterelectrodes 12 and it energizes from the semiconductor wafer 17 surface is taken, there is a problem of melting a ground, and quality plating was not able to be obtained. There was a fault which discharge of the plating liquid 19 also takes time, melts the plating surface which formed membranes, and degrades quality.

[0006]Along with the minuteness making of a semiconductor circuit pattern, management of plating thickness is also becoming severe. Slight processing and an assembly error may be reflected in plating thickness. In the conventional above-mentioned face-up type electrolysis plating device, since the counterelectrode 12 which has big influence on plating thickness was being fixed, processing and an assembly error could not be absorbed but there was a problem that it was difficult to acquire sufficient plating quality.

[0007]This invention was made in view of the above-mentioned point, makes a short time pouring of a treating solution and exhaust time, and those time carries out the 1st purpose for providing the substrate processing device which can solve the debasement produced by this thing for a long time. This invention sets it as the 2nd purpose to provide the substrate processing device which a counterelectrode can process it, can absorb an assembly error and can obtain quality plating.

[0008]

[Means for Solving the Problem]A treatment container which a substrate processing device of this invention always accommodates a treating solution, and has an opening on the bottom, When it is provided in this treatment container so that rise and fall are possible, and it descends, said opening The inside of a treatment container to a wrap lid, If it is provided in said treatment container bottom so that rise and fall are possible, and a plate-like processed board is held on the upper surface and it goes up, a buck which blockades this opening in an opening at said bottom of a treatment container and in which said processed board is located is provided.

[0009]As for this substrate processing device, after a lid has covered an opening at the bottom of a treatment container, a processed board goes up to a buck and one, After said lid descends after this processed board is located in said opening, a lid goes up inside of a treatment container in that state and processing to a processed board is completed after that, and this lid closes said

opening, it operates so that said processed board may descend to a buck and one and may separate from a treatment container.
[0010]In the above-mentioned substrate processing device, an electrode for energization is provided in the bottom of a treatment container so that said processed board may contact, a counterelectrode is provided in the undersurface of a lid, a treating solution is plating liquid further and a device is an electrolysis plating device as one example. In this electrolysis plating device, a lid and a counterelectrode rotate horizontally in the state where inside of a treatment container was gone up.
[0011]
[Embodiment of the Invention]Next, with reference to an accompanying drawing, the embodiment of the substrate processing device by this invention is described in detail. Drawing 1 and drawing 2 are the sectional views showing the semiconductor wafer face-up type electrolysis plating device by this invention as an embodiment of the invention. In these figures, 31 is a plating treatment container which serves as a plating fluid tank, and the plating liquid 32 is always accommodated in an inside. The opening 33 is formed in the bottom of this treatment container 31, and it is an opening. The packing 34 and the electrode 35 for energization are formed in the outer periphery part of 33. Treatment container The plate-like lid 36 is formed in 31. Via the axis 37, it connects with the rise-and-fall actuator 38 of the treatment container 31 upper-part exterior, and this lid 36 is this rise-and-fall actuator. When it can go up and down the inside of the treatment container 31 and descends with 38 and the axis 37, as shown in drawing 1, it is a wrap from the inside of the treatment container 31 about the opening 33 of the treatment container 31 bottom. The counterelectrode 39 is attached to the undersurface of such a lid 36, and DC power supply 40 are connected between this counterelectrode 39 and said electrode 35 for energization. The axis 37 which supports the lid 36 is connected with the rotation part 41 in the upper part exterior of the treatment container 31, and the lid 36 and the counterelectrode 39 rotate the inside of the treatment container 31 at a level with the axis 37 and one in the state where it went up, as shown in drawing 2. The wafer stand 42 is established in the lower part of the treatment container 31 so that rise and fall are possible. If this wafer stand 42 supports the semiconductor wafer 43 on the upper surface and goes up on it, as shown in drawing 2, this opening 33 is blockaded in the bottom opening 33 of the treatment container 31, and it locates the semiconductor wafer 43 in it. At this time, the peripheral end surface of the semiconductor wafer 43 is stuck to the packing 34 and the electrode 35 for energization.
[0012]The case where the above electrolysis plating devices perform electrolysis plating to the semiconductor wafer 43 is explained. Before the plating start, as shown in drawing 1, the lid 36 descended, the lid 36 has covered the opening 33 of the treatment container 31 bottom, and the plating liquid 32 in the treatment container 31 leaks. The wafer stand 42 also descended and the semiconductor wafer 43 of the upper surface is separated from the treatment container 31.
[0013]If plating is started, the wafer stand 42 goes up first, and as the semiconductor wafer 43 supported by the upper surface shows drawing 2, this opening 33 is blockaded in the bottom opening 33 of the treatment container 31, and it is located in it. While sticking the peripheral end surface of the semiconductor wafer 43 to the packing 34 and planning the seal in a peripheral end at this time, it sticks to the electrode 35 for energization, and energization with the semiconductor wafer 43 and DC power supply 40 is secured. Then, as shown in the drawing 2, the counterelectrode 39 of the lid 36 and its undersurface can pull up to the upper part prescribed position in the treatment container 31 by the rise-and-fall actuator 38. Then, the plating liquid 32 of the treatment container 31 is filled between the surface (treated surface) of the semiconductor wafer 43, and the counterelectrode 39 from the moment the lid 36 separated from the bottom of the treatment container 31, Current flows between the counterelectrode 39 and the semiconductor wafer 43 which countered mutually, and plating processing is started to the treated surface of the semiconductor wafer 43. At this time, the lid 36 and the

counterelectrode 39 rotate horizontally by the rotation part 41.
[0014]After plating processing is performed as mentioned above and plating processing is completed, the lid 36 descends again by the rise-and-fall actuator 38, and the lid 36 will be in the state where the bottom opening 33 of the treatment container 31 was again covered as shown in drawing 1. Then, as shown in the drawing 1, the wafer stand 42 descends, and the semiconductor wafer 43 separates from the treatment container 31, and removes the semiconductor wafer 43 from on the wafer stand 42 further.
[0015]If according to the above electrolysis plating devices the plating liquid 32 is always accommodated in the treatment container 31, the lid 36 goes up and it separates from the bottom of the treatment container 31, it will be filled with the plating liquid 32 in an instant between the treated surface of the semiconductor wafer 43, and the counterelectrode 39, and energization of it will be attained. For this reason, etching of the thin film of the copper formed in the treated surface of the semiconductor wafer 43 can be prevented, and quality plating is attained. The inclination and eccentricity to the semiconductor wafer 43 of the counterelectrode 39 by the working error or an assembly error are absorbable by rotating the lid 36 and the counterelectrode 39 horizontally. This may have a constant distance from a semiconductor wafer to a counterelectrode by neither inclination nor eccentricity, if the counterelectrode is being fixed, but if a counterelectrode is rotated, I hear that it can absorb by always moving a delicate gap of distance, it is, and, as a result, quality plating can be obtained. At the same time after the end of processing prevents etching of plating of the copper formed by sending weak current at the time of lid 36 descent, Since it becomes equal to the state where the plating liquid 32 was discharged in an instant and the semiconductor wafer 43 can be taken out shortly after the lid 36 plugs up the opening 33 of the bottom of the treatment container 31, time to etch the plating surface which formed membranes by no energizing can be shortened to a limit, and quality degradation can be prevented.
[0016]Although the above is a case where this invention is applied to an electrolysis plating device, the art of shortening supply of a treating solution and exhaust time using the lid which can go up and down can be used for a washing station or other surface treatment devices, and can aim at improvement in treatment quality. Processed boards may be plate shaped substrates, such as liquid crystal glass other than a semiconductor wafer, and a disk.
[0017]
[Effect of the Invention]As explained to details above, according to the substrate processing device of this invention, those time can solve the debasement produced by this thing for a long time by making pouring of a treating solution and exhaust time into a short time. In the example of an electrolysis plating device, processing of a counterelectrode and an assembly error can be absorbed and quality plating can be obtained.

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CLAIMS

[Claim(s)]
[Claim 1]If always accommodate a treating solution and it is provided in a treatment container which has an opening on the bottom, and this treatment container so that rise and fall are possible, and it descends, A substrate processing device which will be characterized by providing a buck which blockades this opening in an opening at said bottom of a treatment container, and in which said processed board is located if said opening can be provided in a wrap lid and said treatment container bottom from the inside of a treatment container so that rise and fall are possible, a plate-like processed board is held on the upper surface and it goes up.
[Claim 2]After a lid has covered an opening at the bottom of a treatment container, a processed board goes up to a buck and one, This processed board is located in said opening, and a lid goes up inside of a treatment container in that state, The substrate processing device according to claim 1 after said lid descends after processing to a processed board is completed after that, and this lid closes said opening, wherein said processed board descends to a buck and one and separates from a treatment container.
[Claim 3]A substrate processing device which an electrode for energization is provided in the bottom of a treatment container in the substrate processing device according to claim 1 or 2 so that said processed board may contact, a counterelectrode is provided in the undersurface of a lid, and is further characterized by a treating solution's being plating liquid and a device being an electrolysis plating device.
[Claim 4]A substrate processing device, wherein a lid and a counterelectrode rotate horizontally in the state where inside of a treatment container was gone up, in the substrate processing device according to claim 3.

[Translation done.]